WE CLAIM:

1. An apparatus for use in a bufferless network comprising:

   - a first input for receiving traffic units sent from a first source point, the traffic units from the first source point being characterized by a first traffic pattern;

   - a second input for receiving traffic units sent from a second source point, the traffic units from the second source point being characterized by a second traffic pattern;

   - a traffic detection unit coupled to said first and second inputs, said traffic detection unit operative to monitor the traffic units received at said first and second inputs for detecting said first and second traffic patterns;

   - a notification unit for generating a control signal for transmission to either one of the first and second source points on a basis of the first and second traffic patterns detected by said traffic detection unit, said control signal being directive to regulate at least in part the traffic pattern of the traffic units sent from either one of the first and second source points such that a possibility of collision between the traffic units sent from the first source point and the traffic units sent from the second source point is reduced.

2. An apparatus as defined in claim 1, wherein said traffic units are selected from the group consisting of user data units, control units and compound units including a user

data part and a control part.

3. An apparatus as defined in claim 2, wherein said first and second traffic patterns are first and second frame patterns respectively, a frame including a plurality of timeslots in which user data units are sent, each timeslot being associated with a unique sequence identifier.

4. An apparatus as defined in claim 3, wherein each timeslot is associated with a control unit including data indicative of the sequence identifier for the timeslot.

5. An apparatus as defined in claim 4, wherein the control unit further includes data indicative of the source and destination points for user data units contained in the timeslot.

6. An apparatus as defined in claim 5, wherein said traffic detection unit is operative to detect said first frame pattern on a basis of a control unit received from said first source point at said first input.

7. An apparatus as defined in claim 6, wherein said traffic detection unit is operative to detect said second frame pattern on a basis of a control unit received from said second source point at said second input.

8. An apparatus as defined in claim 7, wherein said apparatus includes an output communication link for forwarding traffic units received at said first and second inputs to a particular destination point, said apparatus transmitting traffic units over said output communication link on a basis of a local frame pattern.

9. An apparatus as defined in claim 8, wherein said traffic detection unit includes a machine readable storage medium

holding a data structure, said traffic detection unit being operative to map each one of said first and second frame patterns to the local frame pattern and store the maps in said data structure.

10. An apparatus as defined in claim 9, wherein the notification unit is operative to generate the control signal on a basis of the contents of said data structure.

11. An apparatus as defined in claim 10, wherein the control signal generated by said notification unit conveys a timeslot allocation vector that provides a status indication for each timeslot of the local frame pattern for said output communication link.

12. An apparatus as defined in claim 11, wherein if the control signal is being sent to said first source point, the timeslot allocation vector is indexed on a basis of the mapping between said first frame pattern and the local frame pattern.

13. An apparatus as defined in claim 11, wherein if the control signal is being sent to said second source point, the timeslot allocation vector is indexed on a basis of the mapping between said second frame pattern and the local frame pattern.

14. An apparatus as defined in claim 11, wherein said timeslot allocation vector includes a weighting factor for each timeslot of the local frame pattern for said output communication link, the weighting factor associated with a particular timeslot indicative of a preference rating for the particular timeslot.

15. An apparatus as defined in claim 8, wherein said apparatus

further includes a dynamic timeslot allocation controller, said dynamic timeslot allocation controller operative to dynamically distribute timeslots of the local frame pattern for said output communication link between the traffic received at said first and second inputs on a basis of said first and second frame patterns.

16. An apparatus as defined in claim 15, wherein if free timeslots of the local frame pattern for said output communication link are available, the portion of timeslots that is allocated by said dynamic timeslot allocation controller for traffic received at said first or second input is greater than the portion of timeslots currently being used by the traffic received at said first or second input respectively.

17. An apparatus as defined in claim 1, wherein said apparatus is a switching node in an optical network.

18. An apparatus as defined in claim 1, wherein said apparatus is a transmission node in a multi-hop satellite network.

19. A method for preventing collisions between traffic units sent from a first source point and traffic units sent from a second source point at a transmission node in a bufferless network, the traffic units from the first source point being characterized by a first traffic pattern, the traffic units from the second source point being characterized by a second traffic pattern, said method comprising:

- monitoring the traffic units sent from the first and second source points;
- generating a control signal for transmission to

either one of the first and second source points on a basis of the detected first and second traffic patterns, said control signal being directive to regulate at least in part the traffic pattern of the traffic units sent from either one of the first and second source points such that a possibility of collision between the traffic units sent from the first source point and the traffic units sent from the second source point is reduced.

20. A method as defined in claim 19, wherein the traffic units are selected from the group consisting of user data units, control units and compound units including a user data part and a control part.

21. A method as defined in claim 20, wherein the first and second traffic patterns are first and second frame patterns respectively, a frame including a plurality of timeslots in which user data units are sent, each timeslot being associated with a unique sequence identifier.

22. A method as defined in claim 21, wherein each timeslot is associated with a control unit including data indicative of the sequence identifier for the timeslot.

23. A method as defined in claim 22, wherein each control unit further includes data indicative of the source and destination points for user data units contained in the particular frame timeslot.

24. A method as defined in claim 23, wherein the transmission node includes an output communication link for forwarding traffic units to a particular destination point, the transmission node operative to transmit traffic units over the output communication link on a basis of a local frame

pattern.

25. A method as defined in claim 24, said method comprising the step of mapping each one of said first and second frame patterns to the local frame pattern, the control signal being generated on a basis of this mapping.

26. A method as defined in claim 25, wherein said control signal includes a timeslot allocation vector that provides a status indication for each timeslot of the local frame pattern for the output link.

27. A method as defined in claim 26, wherein if the control signal is being sent to the first source point, the timeslot allocation vector is indexed on a basis of the mapping between the first frame pattern and the local frame pattern.

28. A method as defined in claim 26, wherein if the control signal is being sent to the second source point, the timeslot allocation vector is indexed on a basis of the mapping between the second frame pattern and the local frame pattern.

29. A method as defined in claim 26, wherein the timeslot allocation vector includes a weighting factor for each timeslot of the local frame pattern for the output link, the weighting factor associated with a particular timeslot indicative of a preference rating for the particular timeslot.

30. A method as defined in claim 29, further comprising the step of dynamically distributing timeslots of the local frame pattern for the output communication link between the traffic received from the first and second source

points on a basis of the first and second frame patterns.

31. A method as defined in claim 30, wherein if free timeslots of the local frame pattern for the output communication link are available, the portion of timeslots that is allocated for traffic received from either one of the first and second source points is greater than the portion of timeslots currently being used by the traffic received from either one of the first and second source points, respectively.

32. A bufferless network formed of a plurality of transmission nodes, each one of said plurality of transmission nodes comprising:

- a first input for receiving traffic units sent from a first source point, the traffic units from the first source point being characterized by a first traffic pattern;

- a second input for receiving traffic units sent from a second source point, the traffic units from the second source point being characterized by a second traffic pattern;

- a traffic detection unit coupled to said first and second inputs, said traffic detection unit operative to monitor the traffic units received at said first and second inputs for detecting said first and second traffic patterns;

- a notification unit for generating a control signal for transmission to either one of the first and second source points on a basis of the first and second traffic patterns detected by said traffic

detection unit, said control signal being directive to regulate at least in part the traffic pattern of the traffic units sent from either one of the first and second source points such that a possibility of collision at the transmission node between the traffic units sent from the first source point and the traffic units sent from the second source point is reduced.

33. A network as defined in claim 32, wherein the control signal that is generated by a particular transmission node and sent to a particular source point is updateable by other transmission nodes located along a communication path established between the particular transmission node and the particular source point, for regulating at least in part the traffic pattern of the traffic units sent from the particular source point such that the possibility of collision at the other transmission nodes located along the communication path is reduced.

34. A network as defined in claim 33, wherein said network is an optical network.

35. A network as defined in claim 34, wherein said transmission nodes are switching nodes.

36. A network as defined in claim 33, wherein said network is a multi-hop satellite network.

37. A computer readable storage medium containing a program element for execution by a computing apparatus to implement a device for preventing collisions between traffic units sent from a first source point and traffic units sent from a second source point in a bufferless network, the traffic units from the first source point

being characterized by a first traffic pattern, the traffic units from the second source point being characterized by a second traffic pattern, said device including:

- a traffic detection unit operative to monitor the traffic units sent from the first and second source points for detecting the first and second traffic patterns;

- a notification unit for generating a control signal for transmission to either one of the first and second source points on a basis of the first and second traffic patterns detected by said traffic detection unit, said control signal being directive to regulate at least in part the traffic pattern of the traffic units sent from either one of the first and second source points such that a possibility of collision between the traffic units sent from the first source point and the traffic units sent from the second source point is reduced.

38. A computer readable storage medium as defined in claim 37, wherein the traffic units are selected from the group consisting of user data units, control units and compound units including a user data part and a control part.

39. A computer readable storage medium as defined in claim 38, wherein the first and second traffic patterns are first and second frame patterns respectively, a frame including a plurality of timeslots in which user data units are sent, each timeslot being associated with a unique sequence identifier.

40. A computer readable storage medium as defined in claim 39,

wherein each timeslot is associated with a control unit including data indicative of the sequence identifier for the timeslot.

41. A computer readable storage medium as defined in claim 40, wherein each control unit further includes data indicative of the source and destination points for user data units contained in the particular frame timeslot.

42. A computer readable storage medium as defined in claim 41, wherein said device is operative to transmit traffic units to a particular destination point over an output communication link on a basis of a local frame pattern.

43. A computer readable storage medium as defined in claim 42, wherein said traffic detection unit includes a machine readable storage medium holding a data structure, said traffic detection unit being operative to map each one of said first and second frame patterns to the local frame pattern and store the maps in said data structure.

44. A computer readable storage medium as defined in claim 43, wherein the notification unit is operative to generate the control signal on a basis of the contents of said data structure.

45. A computer readable storage medium as defined in claim 44, wherein the control signal generated by said notification unit conveys a timeslot allocation vector that provides a status indication for each timeslot of the local frame pattern for said output communication link.

46. A computer readable storage medium as defined in claim 45, wherein if the control signal is being sent to the first source point, the timeslot allocation vector is indexed on

a basis of the mapping between the first frame pattern and the local frame pattern.

47. A computer readable storage medium as defined in claim 46, wherein if the control signal is being sent to the second source point, the timeslot allocation vector is indexed on a basis of the mapping between the second frame pattern and the local frame pattern.

48. A computer readable storage medium as defined in claim 47, wherein the timeslot allocation vector includes a weighting factor for each timeslot of the local frame pattern for said output communication link, the weighting factor associated with a particular timeslot indicative of a preference rating for the particular timeslot.

49. A computer readable storage medium as defined in claim 48, wherein said device further includes a dynamic timeslot allocation controller operative to dynamically distribute timeslots of the local frame pattern for said output communication link between the traffic received from the first and second source points on a basis of the first and second frame patterns.

50. A computer readable storage medium as defined in claim 49, wherein if free timeslots of the local frame pattern for said output communication link are available, the portion of timeslots that is allocated by said dynamic timeslot allocation controller for traffic received from the first or second source point is greater than the portion of timeslots currently being used by the traffic received from the first or second source point respectively.

51. A computer readable storage medium as defined in claim 50, wherein said device is a switching node in an optical

network.

52. A computer readable storage medium as defined in claim 51, wherein said device is a transmission node in a multi-hop satellite network.

53. An apparatus for use in a bufferless network comprising:

- first input means for receiving traffic units sent from a first source point, the traffic units from the first source point being characterized by a first traffic pattern;

- second input means for receiving traffic units sent from a second source point, the traffic units from the second source point being characterized by a second traffic pattern;

- traffic detection means coupled to said first and second input means, said traffic detection means operative to monitor the traffic units received at said first and second input means for detecting said first and second traffic patterns;

- notification means for generating a control signal for transmission to either one of the first and second source points on a basis of the first and second traffic patterns detected by said traffic detection means, said control signal being directive to regulate at least in part the traffic pattern of the traffic units sent from either one of the first and second source points such that a possibility of collision between the traffic units sent from the first source point and the traffic units sent from the second source point is reduced.